UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,169	10/18/2003	Anuj Batra	TI-35949	9531

23494 7590 01/16/2008
TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
MUI, GARY	

ART UNIT	PAPER NUMBER
2616	

NOTIFICATION DATE	DELIVERY MODE
01/16/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com
uspto@dlemail.itg.ti.com

Office Action Summary	Application No.	Applicant(s)	
	10/688,169	BATRA ET AL.	
	Examiner	Art Unit	
	Gary Mui	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 October 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings were received on October 30, 2007. These drawings are acceptable.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 12 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Foerster et al. (US 2004/0047285 A1).

For claim 12, Foerster et al. teaches a UWB transmitter generating time-frequency interleaved (TFI) orthogonal frequency division multiplexed (OFDM) signals within the 3.1 – 10.6 GHz UWB band, such that the UWB band is divided into smaller sub-bands (see paragraph 0013, the sub-banded ultra-wideband and paragraph 0017, SB-UWB transmitter).

For claim 14, Foerster et al. teaches a UWB receiver configured to receive TFI-OFDM signals, wherein the UWB transmitter and the UWB receiver together form a personal area network (PAN) (see paragraph 0017 and 0018, the SB-UWB receiver and SB-UWB transmitter combined to form the SB-UWB system).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forster et al. in view of Tewfik et al. (US 2004/0005016 A1).

For claims 1 and 2, Forster et al. teaches a UWB physical layer but fails to teach that the wireless PAN having data payloads communication capability of 55, 110, and 200 Mb/s as

well as capabilities of 80, 160, 320, and 480 Mb/s. Tewfik et al. from the same field of endeavor teaches a high bit rate ultra-wideband the nodes exchange data at bit rates higher than 0.8 Gb/s with short latencies and the system is capable of achieving high bitrate rates on the order of 2 Gb/s (see paragraph 0017 and 0075). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the payload capabilities as taught by Tewfik et al. in Forester et al. SB-UWB communication system. The motivation for doing this is that it will give end users more rate options.

For claim 3, Forester et al. teaches the UWB physical layer is configured to operate as a full-band system (see paragraph 0013, the UWB communication can transmit across all range of frequencies).

For claim 4, Forester et al. teaches the UWB physical layer is further configured to generate a single OFDM signal solely form a contiguous subset of tones (see paragraph 0014).

For claim 5, Forester et al. teaches the UWB physical layer is further configured to employ different subset of tones between consecutive OFDM symbols (see paragraph 0014).

For claim 6, Forester et al. teaches the UWB physical layer is further configured to vary the subset of tones as a function of the time such that the UWB physical layer achieves the same transmit power as a full-band signal that occupies the complete bandwidth spanned by an inverse Fast Fourier Transform (see paragraph 0015).

For claim 7, Forester et al. teaches the UWB physical layer is further configured to generate a signal having a bandwidth greater than 500 MHz in response to 122 tones (see paragraph 0013, generating impulses having a 500 MHz bandwidth).

For claim 8, Forester et al. teaches the UWB physical layer is further configured to generate a single OFDM symbol solely from a contiguous subset of tones, wherein each subset contains 128 consecutive tones (see paragraph 0014)

For claim 9, Forester et al. teaches the UWB physical layer is configured to operate as a sub-band system (see paragraph 0013).

For claim 10, Forester et al. teaches the UWB physical layer is further configured to generate OFDM symbols interleaved across both time and frequency (see paragraph 0014).

Claim Rejections - 35 USC § 103

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Foerster et al. and Tewfik et al. as applied to claims 1, 9, and 10 above, and further in view of Barton et al. (US 6,449,246 B1).

For claim 11, Foerster et al. and Tewfik et al. teaches all of the claimed subject matter with the exception of the UWB physical layer is further configured to insert a guard interval immediately following each OFDM symbol. Barton et al. from the same field of endeavor teaches that practical OFDM techniques always included a guard interval T_G to remove Intersymbol Interference (ISI) caused by non-orthogonal subchannels due to deviations for the ideal model for orthogonal subcahannels (see column 4 lines 42 – 45). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to place a guard interval after an OFDM symbol as taught by Barton et al. into Foerster et al. SB-UWB communication system. The motivation for doing this is to allow for alleviates the transmission channel from interference.

Claim Rejections - 35 USC § 103

9. Claims 13, 15, 16, and 18 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forester et al. in view of Barton et al.

For claim 13, Forester et al. teaches all of the claimed subject matter with the exception of the UWB transmitter further generates a guard interval immediately flowing each OFDM symbol, and wherein the guard interval has a time period sufficient to allow the UWB transmitter to switch from one channel to another. Barton et al. from the same field of endeavor teaches that practical OFDM techniques always included a guard interval T_G to remove Intersymbol Interference (ISI) caused by non-orthogonal subchannels due to deviations for the ideal model for orthogonal subcahannels (see column 4 lines 42 – 45) and the guard interval is implemented in practice by prefixing (postfixing) the last V1 (first V2) samples from the output of the IDFT to the sequence of IDFT output samples. If the precursor guard interval is greater than the maximum value of the delay of the multipath fading channel, then ISI due to Inter-Block Interference (IBI) is eliminated. If the channel is not ideal, ISI due to Inter-Channel Interference (ICI) (caused by interference among OFDM subchannels) cannot be totally eliminated. In practice, the guard interval is typically chosen to be in the range of 10% to 20% of the effective OFDM block length, although for MPACS the range may also be dependent upon the TDMA radio link, and may be adjusted accordingly (see column 4 lines 48 – 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to place a guard interval after an OFDM symbol as taught by

Barton et al. into Foerster et al. SB-UWB communication system. The motivation for doing this is to allow for alleviates the transmission channel from interference.

For claim 15, Foerster et al. teaches providing a UWB physical layer operational to generate OFDM symbols within a desired band and interleaving the OFDM symbols across both time and frequency to divide the desired band into smaller sub-bands (see paragraphs 0013 and 0014). Foerster et al. fails to teach inserting a guard interval after each OFDM symbol, such that the UWB physical layer has sufficient time to switch from its current channel to the next channel. Barton et al. from the same field of endeavor teaches that practical OFDM techniques always included a guard interval T_G to remove Intersymbol Interference (ISI) caused by non-orthogonal subchannels due to deviations for the ideal model for orthogonal subcahannels (see column 4 lines 42 – 45) and the guard interval is implemented in practice by prefixing (postfixing) the last V1 (first V2) samples from the output of the IDFT to the sequence of IDFT output samples. If the precursor guard interval is greater than the maximum value of the delay of the multipath fading channel, then ISI due to Inter-Block Interference (IBI) is eliminated. If the channel is not ideal, ISI due to Inter-Channel Interference (ICI) (caused by interference among OFDM subchannels) cannot be totally eliminated. In practice, the guard interval is typically chosen to be in the range of 10% to 20% of the effective OFDM block length, although for MPACS the range may also be dependent upon the TDMA radio link, and may be adjusted accordingly (see column 4 lines 48 – 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to place a guard interval after an OFDM symbol as taught by Barton et al. into Foerster et al. SB-UWB

communication system. The motivation for doing this is to allow for alleviates the transmission channel from interference.

For claim 16, it is inherent of Foerster et al. SB-UWB communication system that the desired band comprises the 3.1 – 10.6 GHz UWB band because this is the band that is regulated for UWB systems.

For claim 18, Forester et al. teaches the UWB physical layer is further operational to generate a single OFDM signal solely form a contiguous subset of tones (see paragraph 0014).

For claim 19, Forester et al. teaches the UWB physical layer is further operational to employ different subset of tones between consecutive OFDM symbols (see paragraph 0014).

For claim 20, Forester et al. teaches the UWB physical layer is further operational to vary the subset of tones as a function of the time such that the UWB physical layer achieves the same transmit power as a full-band signal that occupies the complete bandwidth spanned by an inverse Fast Fourier Transform (see paragraph 0015).

For claim 21, Forester et al. teaches the UWB physical layer is further operational to generate a signal having a bandwidth greater than 500 MHz in response to 122 tones (see paragraph 0013, generating impulses having a 500 MHz bandwidth).

For claim 22, Forester et al. teaches the UWB physical layer is further operational to generate a single OFDM symbol solely from a contiguous subset of tones, wherein each subset contains 128 consecutive tones (see paragraph 0014).

Claim Rejections - 35 USC § 103

10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Forester et al. and Barton et al. as applied to claim 15 above, and further in view of Tewfik et al.

For claim 17, Forester et al. and Barton et al. teaches all of the claimed subject matter with the exception of the physical layer is further operational to support a wireless PAN having data payload communication capabilities of 55, 80, 110, 160, 200, 320, and 480 Mb/s. Tewfik et al. from the same field of endeavor teaches a high bit rate ultra-wideband the nodes exchange data at bit rates higher than 0.8 Gb/s with short latencies and the system is capable of achieving high bitrate rates on the order of 2 Gb/s (see paragraph 0017 and 0075). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the payload capabilities as taught by Tewfik et al. in Forester et al. SB-UWB communication system. The motivation for doing this is that it will give end users more rate options.

Response to Arguments

11. Applicant's arguments filed October 30, 2007 have been fully considered but they are not persuasive.

In response to the entire content of the remarks, that the Foerster et al. (US 2004/0047285 A1; hereinafter "Foerster") reference does not anticipate the claimed invention. The examiner respectfully disagrees. The Foerster reference a sub-banded ultra-wideband (SB-UWB) where it is time and frequency interleaved (see paragraph 0013). It is noted that Forester teaches an impulse response UWB transmitter and that the remarks state that this is the

difference between the application and the prior art. However, the language of the claims does not recite that the transmitter cannot be from an impulse response. Therefore, the claims are rejectable under Foerster.

In response to the remarks that the Barton reference fails to teach the guard interval. The examiner respectfully disagrees. The Barton reference teaches the insertion of the guard interval to remove ISI. Therefore, the Barton reference teaches the limitation as claimed. It is noted that the guard interval is composed of some cyclic prefix samples and some cyclic postfix samples. In the language of the claim it does not state that the guard interval is composed of zero samples. Therefore, the claims are rejectable under Barton.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary Mui whose telephone number is (571) 270-1420. The examiner can normally be reached on Mon. - Thurs. 9 - 3 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

GM 01.09.2008

RICKY Q. NGO
SUPERVISORY PATENT EXAMINER